Index Number:	

Anglo - Chinese School (Independent)

FINAL EXAMINATION 2019

YEAR ONE IP/ SBGE

LIFE SCIENCES

Wednesday **2 OCTOBER 2019** **1 hour 30 minutes**

INSTRUCTIONS TO STUDENTS
Write your index number in the space at the top of the Question paper.

Section A
Answer **ALL** questions on the Optical Answer Sheet (OAS) using a **soft pencil**.

Section B
Answer **ALL** questions in the spaces provided on the Question paper.

Section C
Answer **ALL** questions in the spaces provided on the Question paper.

At the end of the examination, submit the Optical Answer Sheet (OAS) and the Question paper **separately**.

INFORMATION FOR STUDENTS
The intended number of marks is given in brackets [ ] at the end of each question or part question.

Section	Marks
A	**/ 30**
B	**/ 30**
C	**/ 20**
Total	**/ 80**

Name of Parent / Guardian: _____

Signature & Date:

This paper consists of **20** printed pages, including this cover page.

Section A: Multiple Choice Questions (30 marks)

Select the most appropriate answer for each question below and shade the corresponding letter in the Optical Answer Sheet provided.

1. Which structure in a cell is responsible for the release of energy?

   A. Cell membrane
   B. Cellulose cell wall
   C. Mitochondrion
   D. Starch grain

2. The diagram below shows onion epidermal cells seen under the compound light microscope.
   Identify structure labelled **Z** which gives structural support to the cell.

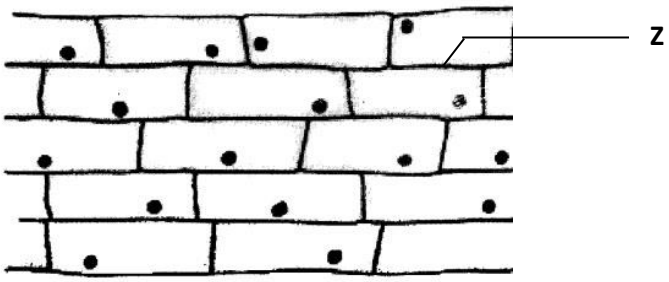


Image taken from: https://www.cbsesamplepapers.info/cbse/

   A. Cell membrane
   B. Cell wall
   C. Cytoplasm
   D. Protoplasm

3. Which of the following statements about mitochondria and chloroplasts is **false**?

   A. Both organelles are oblong.
   B. Mitochondria are found in both plant and animal cells.
   C. Mitochondria are smaller in size compared to chloroplasts.
   D. Only chloroplasts have a double membrane.

4. A student was viewing a prepared slide on human cheek cells, using the X4 objective lens of the compound light microscope.
   What is the **correct** steps to take, if he wants to view the cells under the next higher magnification?

   I Adjust the coarse adjustment knob
   II Adjust the fine adjustment knob
   III Lower the stage
   IV Move the nose piece and click the X10 objective lens in place

   A. IV → I
   B. IV → II
   C. III → IV → I
   D. II → IV → III → I

5. What is the energy conversion that occurs in chloroplasts during photosynthesis?

   A. ATP (energy used by the cell) → Chemical energy
   B. Chemical energy → ATP (energy used by the cell)
   C. Chemical energy → Light energy
   D. Light energy → Chemical energy

6. Which of the following shows examples of tissues in organisms?

   A. blood and connective
   B. epidermal and leaf
   C. epithelial and skin
   D. vascular and shoot

7. What is/ are produced when the muscle undergoes anaerobic respiration?

   A. Carbon dioxide and lactic acid
   B. Carbon dioxide and water
   C. Glucose and water
   D. Lactic acid

For questions 8 and 9, refer to the following experiment on photosynthesis of plants.

In order to investigate how light intensity affects the rate of photosynthesis, a student prepares 5 set-ups, uses hydrilla leaves placed in water with a fixed amount of hydrogen carbonate added, and shines a lamp on the set-up at varying distances. The student then measures the volume of oxygen gas produced. The student completed 3 replicates for this investigation.

8. What is the independent variable?

    A. Distance that lamp is away from the set-up
    B. Mass of hydrilla leaves
    C. Number of set-ups the student prepared
    D. Rate of photosynthesis

9. Which of the following is **not** an important control variable?

    A. Mass of hydrilla leaves
    B. Number of replicates the student completed
    C. Test tube used to collect the oxygen gas
    D. Voltage of the lamp

10. Which of the following about photosynthesis is **false**?

    A. Carbon dioxide and water are reactants in the process.
    B. Chlorophyll is needed for photosynthesis to occur.
    C. Oxygen and glucose are products of the process.
    D. Starch is needed for photosynthesis to occur.

11. In Linnaeus's system of classification, arrange the following from the **least** inclusive to the **most** inclusive.

    A. Kingdom, Phylum, Class, Order, Family, Genus, Species
    B. Kingdom, Phylum, Order, Class, Family, Genus, Species
    C. Species, Family, Class, Genus, Order, Phylum, Kingdom
    D. Species, Genus, Family, Order, Class, Phylum, Kingdom

12. *Rhizobium* bacteria have a symbiotic relationship with leguminous plants.
In Linnaeus's system of classification, what does the word *Rhizobium* refer to?

A. Class
B. Family
C. Genus
D. Species

13. Which of the following examples of vertebrates and invertebrates is **correct**?

	VERTEBRATES	**INVERTEBRATES**
A.	crab	seahorse
B.	frog	jellyfish
C.	prawn	ant
D	sea urchin	stingray

14. Which of the following about the features of two classes of animals is **correct**?

		AMPHIBIA	**REPTILIA**
A.	Body covering	wet scales	dry scales
B.	Body temperature regulation	cold-blooded	cold-blooded
C.	Reproduction	lays eggs	gives birth to live young
D	Respiratory organ	lungs	gills

15. In a neighbourhood park, organisms of different species interact and form a stable ecosystem.
What is the ecological term used to describe such an interaction?

A. Community
B. Habitat
C. Population
D. Species

16. In an ecosystem, there are both abiotic and biotic factors.
Which of the following is **not** an abiotic factor?

A. Air
B. pH
C. Prey
D. Salinity

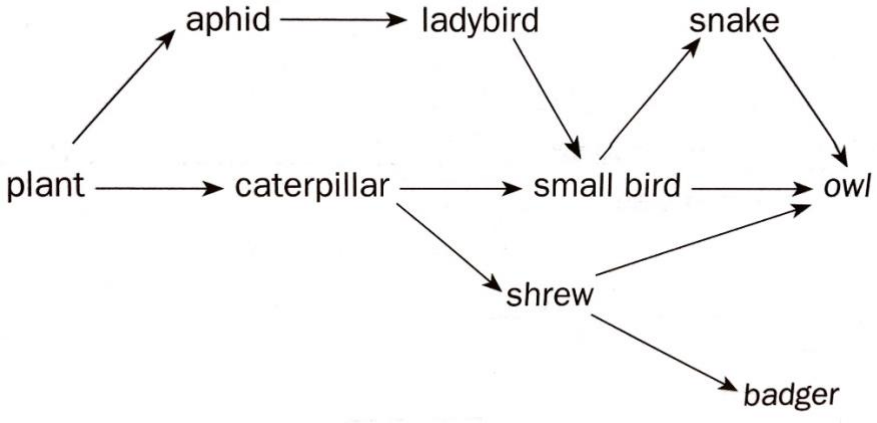
17. Nematodes can be found in soil.
Which of the following does **not** describe nematodes?

A. They are in trophic level 1 of soil food web
B. They can consume other smaller nematodes.
C. They cause economically significant damages to crops.
D. They play a role in nutrient cycling.

18. Mycorrhizal fungi exist in a symbiotic relationship with the roots of some plants. In this relationship, the fungi help the plant to absorb more mineral salts and water from the soil and in turn, the plant supplies it with food.
What type of relationship is this?

A. Ammensalism
B. Commensalism
C. Mutualism
D. Parasitism

For questions 19 and 20, refer to the following food web.



19. Which one of the following organisms is **both** a tertiary and quaternary consumer?

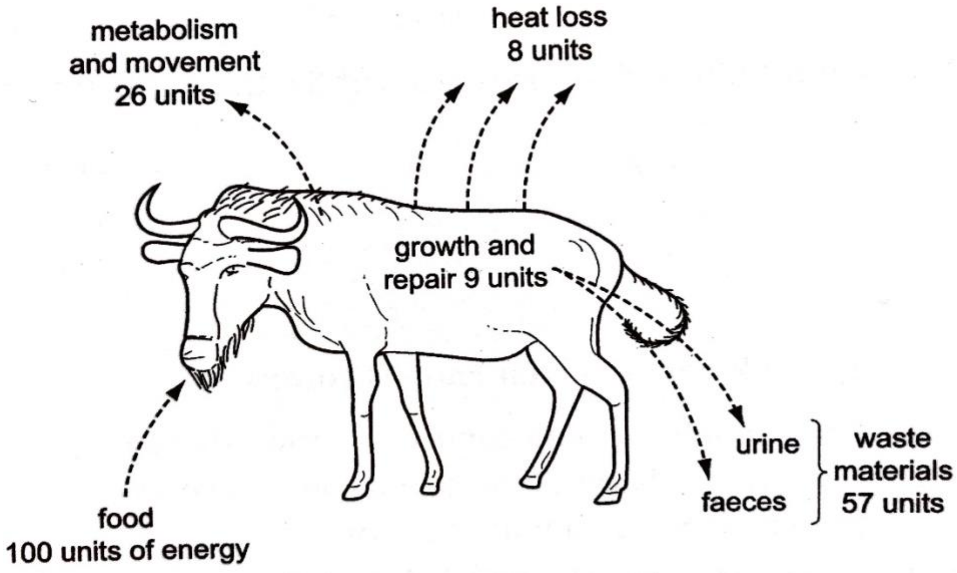
A. Aphid
B. Badger
C. Owl
D. Small bird

20. Which of the following about trophic levels is **correct**?

A. Primary consumers are in trophic level 2.
B. Producers are in trophic level 0.
C. Secondary consumers can only be in trophic level 1.
D. There are altogether 5 trophic levels.

For questions 21 and 22, refer to the following diagram which shows how energy from food is used by a cow in a food chain.

Grass ⟶ **Cow** ⟶ **Cheetah**



21. How many units of energy is passed on to the cheetah?

A. 8
B. 9
C. 26
D. 100

22. Predict the units of energy that was made by the grass.

A. 100
B. 250
C. 500
D. 1000

23. Which of the following statements about viruses is **false**?

A. They are prokaryotic organisms.
B. They exhibit living characteristic only when they are inside a living host.
C. Their genetic material is either DNA or RNA.
D. They have a protein coat that encases their genetic material.

24. Which of the following disease/ condition is **not** caused by a virus?

A. Hand Foot and Mouth Disease
B. Influenza
C. Malaria
D. Mumps

25. How does the exchange of genetic materials take place in bacteria?

A. Binary fission
B. Budding
C. Conjugation
D. Sporulation

26. Which of the following organisms is a fungus?

A. Amoeba
B. *Lactobacillus*
C. *Plasmodium*
D. Yeast

27. What is the mode of nutrition for fungi which decompose dead organisms?

A. Chemoautotrophic
B. Phagocytic
C. Photosynthetic
D. Saprotrophic

28. The diagram below shows how an amoeba reproduces. What is the name of this process?

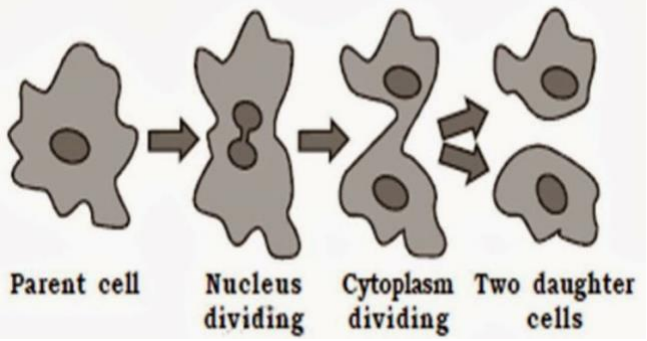


Image taken from: https://brainly.in

A. Binary fission
B. Budding
C. Conjugation
D. Sporulation

29. Which of the following about antibiotics is **false**?

A. They are effective towards both bacterial and viral infections.
B. They are mainly produced naturally by bacteria or fungi.
C. They either inhibit the growth or kill certain microorganisms.
D. They might not be always effective towards the same group of microorganisms.

30. Which of the following does **not** show how bacteria acquire antibiotic resistance?

A. Acquire certain genes from bacteriophages.
B. Acquire DNA parts from environment through transformation.
C. Reproduce asexually through binary fission.
D. Transfer of plasmids through conjugation.

Section B: Structured Questions (30 marks)

Answer all the questions in the spaces given.

1. Fig. 1 below shows a cell.

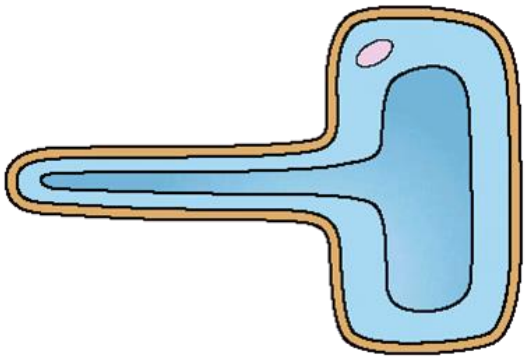


Fig. 1

a) i) Identify whether the cell is a plant or animal cell. [1]

_____

ii) Give reasons for your answer (ai). [2]

_____

_____

_____

b) The cell above is different in shape from a typical cell.

Suggest where you might find such a cell in an organism and how such an irregular shape may benefit the organism. [2]

_____

_____

_____

_____

2. A dichotomous key is one of the systematic ways in which ecologists group organisms, based on their external morphology.

There are 5 organisms, **A**, **B**, **C**, **D** and **E**, shown below.

A

B

C

D

E

Construct a dichotomous key in the space provided below and the next page, to differentiate all organisms completely (it is **not** necessary to name them). [5]

This page has been intentionally left blank.

3. Scientists use a process known as bioremediation, in which microorganisms are deliberately introduced to break down environmental pollutants, so as to clean a polluted site.

a) Soil gets contaminated when there is an oil spill.

i) State one harmful effect of oil spills to plants. [1]

_____

_____

ii) Name one genus of bacteria that could be used to clean this polluted soil. [1]

_____

b) The following is an extract from an article published in The Straits Times Oct 3, 2017:

Patches of the Singapore River turned a startling shade of green yesterday morning because of an algal overgrowth.

People working in the area said they noticed a greenish tint on the water's surface two days earlier. Some detected a pungent smell too.

"I was quite shocked. I was wondering if it was because the water was polluted," said Ms Tina Teng, 29, a service staff member at a seafood restaurant on Boat Quay.

i) Name the process that caused the phenomenon described above. [1]

_____

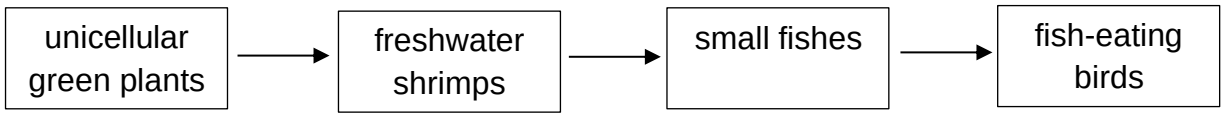
ii) Outline one farming practice that could cause the above phenomenon. [1]

_____

iii) When such a phenomenon occurs, what gas is lacking in the river that causes aquatic organisms to die? [1]

_____

4. a) A food chain is shown below:



i) In the space provided below, draw a **labelled** pyramid of energy to represent this food chain. [1]

ii) If the unicellular green plants can make a total of 30, 000kJ of energy, indicate the amount of energy available to the rest of the trophic levels, in the ecological pyramid that you have drawn in (i) above. [1]

b) Name a process that **all** the organisms in the food chain carry out. [1]

_____

c) Explain why there are rarely more than 4 or 5 trophic levels in a food chain. [2]

_____

_____

_____

_____

5. Fig. 2 below shows the structure of a dengue virus.

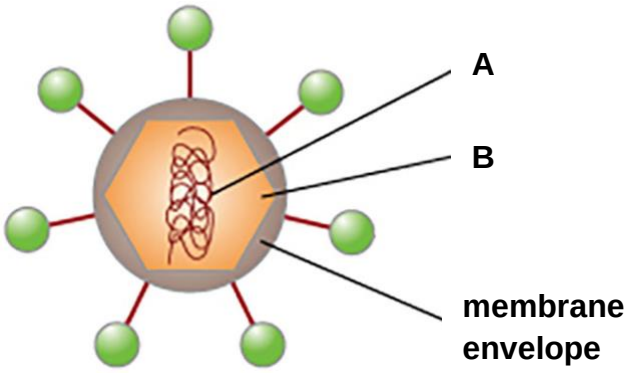


Fig. 2

Image taken from: https://www.nature.com

a) Name the parts labelled **A** and **B.** [2]

A _____

B _____

b) What are micro-organisms? [1]

_____

_____

c) Differentiate between a prokaryotic and eukaryotic cell. [2]

_____

_____

_____

_____

6. Fig. 3 below shows an experiment in which Quadrants A and B are controls while Quadrants C and D are two different organic substances that were used to test their anti-microbial effect against *B. subtilis.*

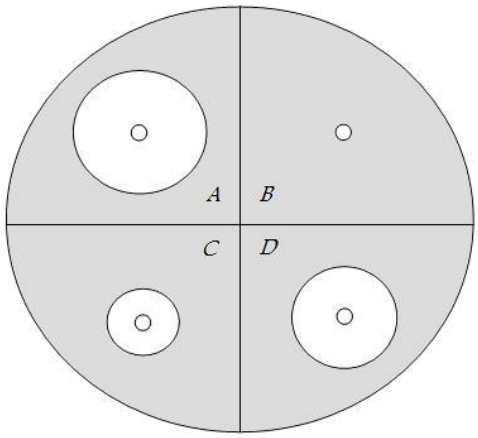


Fig. 3

a) Explain which Quadrant is the negative control. [2]

_____

_____

_____

b) Measure and record the zone of inhibition in Quadrant A. [1]

_____

c) Explain which organic compound is more effective in its bactericidal effect against *B. subtilis*. [2]

_____

_____

_____

Section C: Free Response Question (20 marks)

Answer all the questions in the spaces given.

1. a) Fig. 4 below shows an experiment taking place with a live grasshopper.

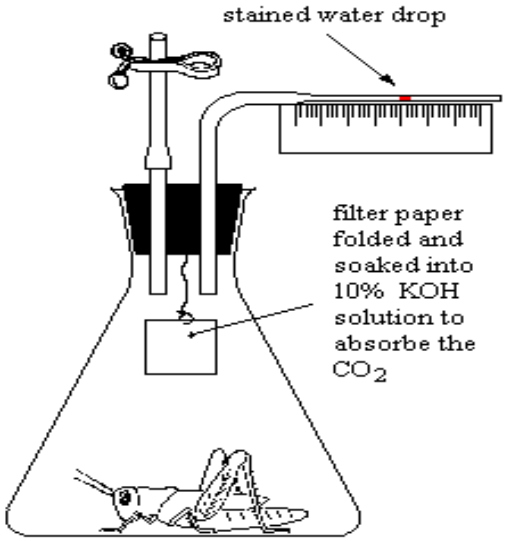


Fig. 4

State and explain the direction of movement of the stained water drop. [5]

b) Black opaque paper was placed on both sides of a variegated leaf, as shown in Fig. 5 below. The leaf, while still attached to the plant, was then placed in the dark for 2 days. After the **dark stage**, the plant was exposed to strong sunlight for a week. The leaf was then removed and tested for starch.

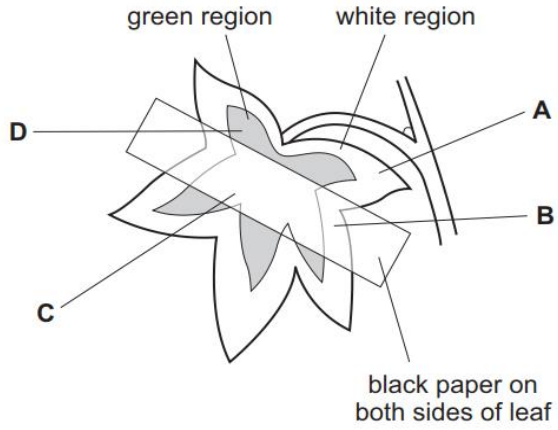


Fig. 5

Explain the following step and observation. [5]

i) Dark stage

ii) Region A

2. The five-kingdom system of classification for all organisms, has been widely accepted since it was proposed in 1969.

a) Compare the following features for **each** of the 5 classes of animals:
   i) Body temperature regulation
   ii) Reproduction
   iii) Respiratory organ [6]

b) An ecosystem has both biotic and abiotic factors.

State the abiotic conditions of a desert ecosystem and explain how these factors give rise to different adaptations and behavior of two organisms, **cactus** and **camel**, which are found there. [4]

End of Paper

Answer Scheme

Section A

1. C	2. B	3. D	4. B	5. D	6. A	7. D	8. A	9. B	10. D
11. D	12. C	13. B	14. B	15. A	16. C	17. A	18. C	19. C	20. A
21. B	22. D	23. A	24. C	25. C	26. D	27. D	28. A	29. A	30. C

Section B

1) a) i) Plant cell [1]

ii) Presence of a cell wall [1]
Presence of large central vacuole [1]

b) Roots [1]
Increase surface area for better/ more efficient absorption of water / nutrients / mineral salts [1]

2)
1. Presence of feathers ---------- E [1]
   Absence of feathers ---------- go to 2
2. Presence of fur/ hair ---------- D [1]
   Absence of fur/ hair ---------- go to 3
3. Presence of fins ---------- C [1]
   Absence of fins ---------- go to 4
4. Presence of moist skin ---------- A [1]
   Absence of moist skin ---------- B [1]

Or any other valid dicot key

3) a) i) Plants would not obtain sufficient water for photosynthesis. [1]

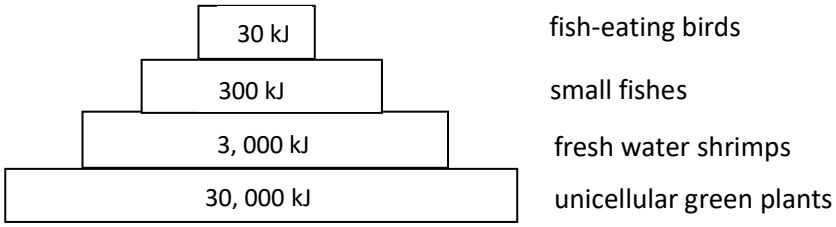
ii) *Pseudomonas* bacteria [1]

b) i) Eutrophication [1]

ii) Excessive use of fertilizers [1]

iii) Oxygen [1]

4) a) i)



Pyramid of energy [1]
Energy value [1]

b) Respiration [1]

c) Organisms of each trophic level only pass 10% energy to the next [1]
There is not enough energy to support any organisms in the 4th or 5th trophic level [1]

5) a) A: Nucleic acid/ Genetic material/ DNA/ RNA [1]
B: Protein coat/ capsid [1]

b) Organism that are too small to be seen with the naked eye [1]

c) Any 2:
Nucleus vs no nucleus [1]
Ribosome smaller (pro) vs bigger (eu) [1]
No membrane bound organelles like mitochondria/ chloroplast (pro) [1]
Any other valid point.

6) a) Quadrant B [1]
There is no zone of inhibition seen [1]

b) 7 mm +/- 1 [1]

c) Organic compound D [1]
There is a greater / wider zone of inhibition than quadrant C [1]

Section C

1) a) Drop moves left [1]
Grasshopper undergoes aerobic respiration [1]
Grasshopper produces carbon dioxide /CO_2 [1]
Grasshopper consumes /takes in /uses oxygen / O_2 [1]
Cardon dioxide /CO_2 absorbed by KOH /potassium hydroxide and volume of gases decreases [1]

b) i) Dark stage: To destarch the leaf [1]
To ensure a fair experiment /accurate results [1]

ii) Region A : Iodine remains yellow/ brown [1]
Region has no chlorophyll [1]
No photosynthesis hence no starch [1]

2) a) For each feature, 1st mark awarded if feature is correct for 2 classes of animals; 2nd mark awarded if feature is correct for the remaining 3 classes.

	Amphibians	Reptiles	Fishes	Birds	Mammals
Body temperature regulation	cold-blooded	cold-blooded	cold-blooded	warm-blooded	warm-blooded
Reproduction	lay eggs	lay eggs	lay eggs	lay eggs	give birth to live young
Respiratory organ	lungs	lungs	gills	lungs	lungs

b) very high temperature in the day [1]
very little/ no rainfall [1]
cactus have spines to reduce water loss [1]
camels have humps which are fat reserves that can be broken down to get metabolic water [1]

Any other valid point